



## Halon Substitutes Under SNAP as of May 29, 2013

**SNAP Information:** <http://www.epa.gov/ozone/snap>

EPA has created the Significant New Alternatives Policy (SNAP) Program under section 612 of the Clean Air Act Amendments. SNAP evaluates alternatives to ozone-depleting substances. Substitutes are reviewed on the basis of ozone depletion potential, global warming potential, toxicity, flammability, and exposure potential as described in the March 18, 1994 final SNAP rule (59 FR 13044). Lists of acceptable and unacceptable substitutes will be updated periodically in the Federal Register. The following SNAP notices and subsequent final rules are included in this list: August 26, 1994 (59 FR 44240), January 13, 1995 (60 FR 3318), June 13, 1995 (60 FR 31092), July 28, 1995 (60 FR 38729), February 8, 1996 (61 FR 4736), May 22, 1996 (61 FR 25585), September 5, 1996 (61 FR 47012), October 16, 1996 (61 FR 54030), March 10, 1997 (62 FR 10700), June 3, 1997 (62 FR 30275), February 24, 1998 (63 FR 9151), May 22, 1998 (63 FR 28251), January 26, 1999 (64 FR 3861), April 28, 1999 (64 FR 22981), April 26, 2000 (64 FR 30410), April 26, 2000 (65 FR 24387), January 29, 2002 (67 FR 4185), December 20, 2002 (67 FR 77927), August 21, 2003 (68 FR 50533), October 1, 2004 (69 FR 58903), March 29, 2006 (71 FR 15589), September 27, 2006 (71 FR 56359), January 2, 2009 (74 FR 21), October 4, 2011 (76 FR 61269), August 10, 2012 (77 FR 47768), September 19, 2012 (77 FR 58035), December 14, 2012 (77 FR 74381), April 29, 2013 (78 FR 24997), and May 17, 2013 (78 FR 29034).

<b>Acceptable Substitutes for Halon 1211 Streaming Agents Under the Significant New Alternatives Policy (SNAP) Program as of May 29, 2013</b>		
<b>Substitute</b>	<b>Trade Name</b>	<b>Comments</b>
HCFC-123	FE-232	Non-residential uses only.
HCFC-124	FE-241	Non-residential uses only.
[HCFC Blend] B	Halotron 1	Non-residential uses only.
[HCFC Blend] C	NAF P-III	Non-residential uses only.
[HCFC Blend] D	Blitz III	Non-residential uses only.
Gelled Halocarbon/Dry Chemical Suspension	Envirogel	Allowable in the residential use market.
[Surfactant Blend] A	Cold Fire, FlameOut, Fire Strike	
Water Mist Systems using Potable or Natural Sea Water		
Carbon Dioxide		
Dry Chemical		
Water		

**Acceptable Substitutes for Halon 1211 Streaming Agents Under the  
Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

<b>Substitute</b>	<b>Trade Name</b>	<b>Comments</b>
Foam		
Firebane ® 1170, Firebane ® 1179	Firebane ® 1170, Firebane ® 1179	Follow the manufacturer's guidelines in the MSDS.  EPA recommends that use of these systems be in accordance with the latest edition of NFPA 10 Standard for Portable Extinguishers.  Notes 1,2
Firebane ® 1175, Firebane ® All-Weather 1175	Firebane ® 1175, Firebane ® All-Weather 1175	Follow the manufacturer's guidelines in the MSDS.  EPA recommends that use of these systems be in accordance with the latest edition of NFPA 10 Standard for Portable Extinguishers.  Notes 1,2

Note 1: EPA recommends that users consult Section VIII of the OSHA Technical Manual for information on selecting the appropriate types of personal protective equipment for all listed fire suppression agents. EPA has no intention of duplicating or displacing OSHA coverage related to the use of personal protective equipment (e.g., respiratory protection), fire protection, hazard communication, worker training or any other occupational safety and health standard with respect to halon substitutes.

Note 2: Use of all listed fire suppression agents should conform to relevant OSHA requirements, including 29 CFR part 1910, subpart L, sections 1910.160 and 1910.162.

**Acceptable Substitutes for Halon 1211 Streaming Agents Subject to Narrowed Use Limits  
under the Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

Substitute	Trade Name	Limitations	Comments
[HCFC Blend] E	NAF P-IV	Acceptable in nonresidential uses only.	As with other streaming agents, EPA recommends that potential risks of combustion byproducts be labeled on the extinguisher (see UL 2129).  See comments 1, 2.
HFC-227ea	FM-200	Acceptable in nonresidential uses only.	See comments 1, 2
HFC-236fa		Acceptable in nonresidential uses when manufactured using any process that does not convert perfluoroisobutylene (PFIB) directly to HFC-236fa in a single step.	See comments 1, 2, 3
CF <sub>3</sub> I		Acceptable in nonresidential uses only.	
C <sub>6</sub> F <sub>14</sub>	PFC-614, CEA-614	Acceptable for nonresidential uses where other alternatives are not technically feasible due to performance or safety requirements because of their physical or chemical properties.	Users should observe the limitations on PFC acceptability by making reasonable effort to undertake the following measures:  (i) conduct an evaluation of foreseeable conditions of end use; (ii) determine that the physical or chemical properties or other technical constraints of the other available agents preclude their use; and (iii) determine that human exposure to the other alternative extinguishing agents may result in failure to meet applicable use conditions; <b>Documentation of such measures should be available for review upon request.</b>  See additional comments 1, 2
C6-perfluoroketone (1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone)	Novec 1230	Acceptable in nonresidential uses only.	For operations that fill canisters to be used in streaming applications, EPA recommends the following: - install and use adequate ventilation ; - clean up all spills immediately in accordance with good industrial hygiene practices; and - provide training for safe handling procedures to all employees that would be likely to handle containers of the agent or extinguishing units filled with the agent. See additional comments 1, 2, 4, 5

**Acceptable Substitutes for Halon 1211 Streaming Agents Subject to Narrowed Use Limits  
under the Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

Substitute	Trade Name	Limitations	Comments
H Galden HFPEs		Acceptable in nonresidential uses only.	<p>For operations that fill canisters to be used in streaming applications, EPA recommends the following:</p> <ul style="list-style-type: none"> <li>- install and use adequate ventilation ;</li> <li>- clean up all spills immediately in accordance with good industrial hygiene practices; and</li> <li>- provide training for safe handling procedures to all employees that would be likely to handle containers of the agent or extinguishing units filled with the agent.</li> </ul> <p>See additional comments 1, 2, 4, 5</p>
C7-fluoroketone	TBD	Acceptable in nonresidential uses only.	<p>Use of this agent should be in accordance with the latest edition of NFPA Standard 10 for Portable Fire Extinguishers.</p> <p>For operations that fill canisters to be used in streaming applications, EPA recommends the following:</p> <ul style="list-style-type: none"> <li>—Adequate ventilation should be in place;</li> <li>—All spills should be cleaned up immediately in accordance with good industrial hygiene practices; and</li> <li>—Training for safe handling procedures should be provided to all employees that would be likely to handle containers of the agent or extinguishing units filled with the agent.</li> </ul> <p>This substitute is a blend of 3-pentanone,1,1,1,2,4,5,5,5-octafluoro-2,4-bis(trifluoromethyl) (Chemical Abstracts Service Registry Number [CAS Reg. No.] 813-44-5) and 3-hexanone,1,1,1,2,4,4,5,5,6,6,6-undecafluoro-2-(trifluoromethyl) (CAS Reg. No. 813-45-6).</p> <p>See additional comments 1, 2, 4, 5</p>

Additional Comments

1. Discharge testing and training should be strictly limited only to that which is essential to meet safety or performance requirements.
2. The agent should be recovered from the fire protection system in conjunction with testing or servicing, and recycled for later use or destroyed.
3. Acceptable for local application systems inside textile process machinery.
4. As with other streaming agents, EPA recommends that potential risks of combustion by-products be labeled on the extinguisher (see UL 2129)
5. EPA has no intention of duplicating or displacing OSHA coverage related to the use of personal protective equipment (e.g., respiratory protection), fire protection, hazard communication, worker training or any other occupational safety and health standard with respect to halon substitutes

**Acceptable Substitutes for Halon 1301 Total Flooding Agents Under the  
Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

<b>Substitute</b>	<b>Trade Name</b>	<b>Comments</b>
Powdered Aerosol C	PyroGen, Soyuz	For use in unoccupied areas only.
Powdered Aerosol A	SFE	For use in unoccupied areas only.
Carbon Dioxide		System design must adhere to OSHA 1910.162(b)(5) and NFPA Standard 12
Water		
Water Mist Systems using Potable or Natural Sea Water		
HCFC-22		<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>The comparative design concentration based on cup burner values is approximately 13.9% while its cardiotoxic LOAEL is 5.0%. Thus, it is unlikely that this agent will be used in normally occupied areas.</p> <p>See additional comments 1, 2, 3, 4, 5, 6</p>
HCFC-124		<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>The comparative design concentration based on cup burner values is approximately 8.4% while its cardiotoxic LOAEL is 2.5%. Thus, it is unlikely that this agent will be used in normally occupied areas.</p> <p>See additional comments 1, 2, 3, 4, 5</p>
[HCFC Blend] A	NAF S-III	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>The comparative design concentration based on full scale testing is approximately 8.6%.</p> <p>The agent should be recovered from the fire protection system in conjunction with testing or servicing, and should be recycled for later use or destroyed.</p> <p>Feasible for use in a normally occupied area.</p> <p>See additional comments 1, 2, 3, 4, 5</p>

**Acceptable Substitutes for Halon 1301 Total Flooding Agents Under the  
Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

Substitute	Trade Name	Comments
HFC-23	FE 13	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>The comparative design concentration based on cup burner values is approximately 14.4% while data indicates that its cardiotoxicity NOAEL is 30% without added oxygen and 50% with added oxygen. Its LOAEL is likely to exceed 50%.</p> <p>Feasible for use in a normally occupied area.</p> <p>See additional comments 1, 2, 3, 4, 5</p>
HFC-125	FE 25	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>The comparative design concentration based on cup burner values is approximately 11.3% while its cardiotoxic LOAEL is 10.0%. Thus, it is unlikely that this agent will be used in normally occupied areas.</p> <p>See additional comments 1, 2, 3, 4, 5</p>
HFC-134a		<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>The comparative design concentration based on cup burner values is approximately 12.6% while its cardiotoxic LOAEL is 8.0%. Thus, it is unlikely that this agent will be used in normally occupied areas.</p> <p>See additional comments 1, 2, 3, 4, 5, 6</p>

**Acceptable Substitutes for Halon 1301 Total Flooding Agents Under the  
Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

Substitute	Trade Name	Comments
HFC-227ea	FM-200	<p>The comparative design concentration based on cup burner values is approximately 7.0% while data indicate that its cardiotoxicity LOAEL is probably greater than 10.5%. EPA is accepting 10.5% as its LOAEL. Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>This agent was submitted to the Agency as a Premanufacture Notice (PMN) agent and is presently subject to requirements contained in a Toxic Substances Control Act (TSCA) Significant New Use Rule (SNUR).</p> <p>Feasible for use in a normally occupied area.</p> <p>See additional comments 1, 2, 3, 4, 5</p>
IG-100	NN100	<p>IG-100 systems must include alarms and warning mechanisms.</p> <p>Workplace personnel and employees should not remain in or re-enter the area after system discharge (even if such discharge is accidental) without appropriate personal protective equipment.</p> <p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>See additional comments 1, 2 and 5.</p>
IG-01  (formerly Inert Gas Blend C)	Argotec	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>The Agency does not contemplate personnel remaining in the space after system discharge during a fire without Self Contained Breathing Apparatus (SCBA) as required by OSHA.</p> <p>EPA does not encourage any employee to intentionally remain in the area after system discharge, even in the event of accidental discharge. In addition, the system must include alarms and warning mechanisms as specified by OSHA.</p> <p>See additional comments 1, 2, 5.</p>

**Acceptable Substitutes for Halon 1301 Total Flooding Agents Under the  
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<b>Substitute</b>	<b>Trade Name</b>	<b>Comments</b>
IG-55  (formerly Inert Gas Blend B)	Argonite	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>The Agency does not contemplate personnel remaining in the space after system discharge during a fire without Self-Contained Breathing Apparatus (SCBA) as required by OSHA.</p> <p>EPA does not encourage any employee to intentionally remain in the area after discharge, even in the event of accidental discharge. In addition, the system must include alarms and warning mechanisms as specified by OSHA.</p> <p>See additional comments 1, 2, 5</p>
IG-541	Inergen	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>Studies have shown that healthy, young individuals can remain in a 10% to 12% oxygen atmosphere for 30 to 40 minutes without impairment. However, in a fire emergency, the oxygen level may be reduced below safe levels, and the combustion products formed by the fire are likely to cause harm. Thus, the Agency does not contemplate personnel remaining in the space after system discharge during a fire without Self Contained Breathing Apparatus (SCBA) as required by OSHA.</p> <p>Feasible for use in a normally occupied area.</p> <p>This agent contains CO<sub>2</sub>, which is intended to increase blood oxygenation and cerebral blood flow in low oxygen atmospheres. The design concentration should result in no more than 5% CO<sub>2</sub>.</p> <p>See additional comments 1, 2, 5</p>
Gelled Halocarbon/Dry Chemical Suspension with ammonium polyphosphate additive	Envirogel with ammonium polyphosphate additive	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems, for whichever hydrofluorocarbon gas is employed.</p> <p>Envirogel is listed as a streaming substitute under the generic name Gelled Halocarbon / Dry Chemical Suspension. Envirogel was also previously listed as a total flooding substitute under the same generic name.</p> <p>See additional comments 1, 2, 3, 4, 5.</p>



**Acceptable Substitutes for Halon 1301 Total Flooding Agents Under the  
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<b>Substitute</b>	<b>Trade Name</b>	<b>Comments</b>
Foam A (formerly [Water Mist / Surfactant Blend] A)	Phirex+	This agent is not a clean agent, but is a low-density, short duration foam.
Uni-light Advanced Fire Fighting Foam 1% water mist system	Uni-light AFFF 1%	<p>This agent is intended for use onboard ships and in off-shore installations. It may be used both in normally occupied and unoccupied areas.</p> <p>Appropriate personal protective equipment should be worn during manufacture or in the event of a release. Personal protective equipment should include safety goggles, protective gloves, and a self-contained breathing apparatus.</p> <p>Supply bottles for the foam should be clearly labeled with the potential hazards associated with the use of the chemicals in the foam, as well as handling procedures to reduce risk resulting from these hazards.</p> <p>Should conform with relevant OSHA requirements, including 29 CFR 1910, Subpart L, Sections 1910.160 and 1910.163.e See additional note 5.</p>
Firebane® 1179	Firebane® 1179	Follow the manufacturer's guidelines in the MSDS. This agent is an aqueous surfactant blend.
Surfactant Blend A	Cold Fire®	Observe recommendations in the manufacturer's MSDS and guidance for using this substitute.
Solution of 50% potassium acetate and 50% water	K-Ace	<p>EPA recommends that use of this system should be in accordance with the manufacturer's MSDS.</p> <p>EPA recommends that users consult Section VIII of the OSHA Technical Manual for information on selecting the appropriate types of personal protective equipment for all listed fire suppression agents.</p> <p>Use must conform to relevant OSHA requirements, including 29 CFR Part 1910, subpart L, sections 1910.160 and 1910.162</p> <p>See additional note 5.</p>
C6-perfluoroketone (1,1,1,2,2,4,5,5,5- nonafluoro-4-(trifluoromethyl)-3- pentanone)	Novec 1230	<p>Use of the agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>For operations that install and maintain total flooding systems using this agent, EPA recommends the following:</p> <ul style="list-style-type: none"> <li>- install and use adequate ventilation ;</li> <li>- clean up all spills immediately in accordance with good industrial hygiene practices; and</li> <li>- provide training for safe handling procedures to all employees that would be likely to handle containers of the agent or extinguishing units filled with the agent.</li> </ul> <p>See additional notes 1, 2, 3, 4, 5.</p>

**Acceptable Substitutes for Halon 1301 Total Flooding Agents Under the  
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Substitute	Trade Name	Comments
HFC-125 with 0.1% <i>d</i> -limonene	NAF S 125	<p>Use of the agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>Extinguisher bottles should be clearly labeled with the potential hazards and handling procedures associated with the use of HFC-125 and <i>d</i>-limonene, to reduce risk resulting from these hazards.</p> <p>See additional notes 1, 2, 3, 4, 5.</p>
HFC-227ea with 0.1% <i>d</i> -limonene	NAF S 227	<p>Use of the agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>Extinguisher bottles should be clearly labeled with the potential hazards and handling procedures associated with the use of HFC-227ea and <i>d</i>-limonene, to reduce risk resulting from these hazards. See additional notes 1, 2, 3, 4, 5.</p>
Nitrogen/Water Mist Vortex System	Victaulic Vortex System	EPA recommends that users consult Section VIII of the Occupational Safety & Health Administration (OSHA) Technical Manual for information on selecting the appropriate types of Personal Protective Equipment (PPE). EPA recommends that use of this system should be in accordance with the safe exposure guidelines for inert gas systems in the latest edition of NFPA 2001, specifically the requirements for residual oxygen levels, and should be in accordance with the relevant operational requirements in NFPA 750 Standard on Water Mist Fire Protection Systems.
OS-10	ATK OS-10	<p>EPA recommends that users consult Section VIII of the Occupational Safety &amp; Health Administration (OSHA) Technical Manual for information on selecting the appropriate types of Personal Protective Equipment (PPE).</p> <p>EPA recommends that use of this system should be in accordance with the safe exposure guidelines for inert gas systems in the latest edition of NFPA 2001, specifically the requirements for residual oxygen levels, and should be in accordance with the relevant operational requirements in NFPA Standard 2010 for Aerosol Extinguishing Systems.</p> <p>Use should conform with relevant OSHA requirements, including 29 CFR part 1910, subpart L, sections 1910.160 and 1910.162.</p> <p>See additional note 5.</p>
N2 Towers® System	N2 Towers® System	EPA recommends that use of this system should be in accordance with the safe exposure guidelines for inert gas systems in the latest edition of NFPA 2001 Standard on Clean Agent Fire Extinguishing Systems, specifically the requirements for residual oxygen levels, and use should be in accordance with the NFPA Standard 2010 for Aerosol Extinguishing Systems.

Additional Comments

1. Must conform with OSHA 29 CFR 1910 Subpart L Section 1910.160.
2. Per OSHA requirements, protective gear (SCBA) must be available in the event personnel must reenter the area.
3. Discharge testing should be strictly limited only to that which is essential to meet safety or performance requirements.
4. The agent should be recovered from the fire protection system in conjunction with testing or servicing, and recycled for later use or destroyed.
5. EPA has no intention of duplicating or displacing OSHA coverage related to the use of personal protective equipment (e.g., respiratory protection), fire protection, hazard communication, worker training or any other occupational safety and health standard with respect to EPA's regulation of halon substitutes.
6. The NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems gives guidelines for blends that contain HFC-134a or HCFC-22 and other acceptable total flooding agents, rather than referring to HFC-134a or HCFC-22 alone.

**Acceptable Substitutes for Halon 1301 Total Flooding Agents Subject to Use Conditions  
under the Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

<b>Substitute</b>	<b>Trade Name</b>	<b>Conditions</b>	<b>Comments</b>
Inert Gas/ Powdered Aerosol Blend	FS 0140	For use in normally unoccupied areas only.  Any employee who could possibly be in the area must be able to escape within 30 seconds. The employer shall ensure that no unprotected employees enter the area during discharge.	The manufacturer's SNAP application requested listing for use in unoccupied areas only.  See additional comment 2.
Gelled Halocarbon/Dry Chemical Suspension with sodium bicarbonate additive	Envirogel with sodium bicarbonate additive	Use of whichever hydrofluorocarbon gas (HFC-125, HFC-227ea, or HFC-236fa) is employed in the formulation must be in accordance with all requirements for acceptability (i.e., narrowed use limits) of that HFC under EPA's SNAP program.	Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems, for whichever hydrofluorocarbon gas is employed.  Sodium bicarbonate release in all settings should be targeted so that increased blood pH level would not adversely affect exposed individuals.  Users should provide special training, including the potential hazards associated with the use of the HFC agent and sodium bicarbonate, to individual required to be in environments protected by Envirogel with sodium bicarbonate additive extinguishing systems.  Each extinguisher should be clearly labeled with the potential hazards from use and safe handling procedures.  See additional comments 1, 2, 3, 4, 5.
Powdered Aerosol D	Aero K, Stat X	For use only in normally unoccupied areas.	Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2010 standard for Aerosol Extinguishing Systems.  For establishments manufacturing the agent or filling, installing, or servicing containers or systems to be used in total flooding applications, EPA recommends the following: <ul style="list-style-type: none"> <li>- adequate ventilation should be in place to reduce airborne exposure to constituents of agent;</li> <li>- an eye wash fountain and quick drench facility should be close to the production area;</li> <li>- training for safe handling procedures should be provided to all employees that would be likely to handle containers of the agent or extinguishing units filled with the agent;</li> <li>- workers responsible for clean up should allow for maximum settling of all particulates before reentering area and wear appropriate protective equipment; and</li> <li>- all spills should be cleaned up immediately in accordance with good industrial hygiene practices.</li> </ul> See additional comments 1, 2, 3, 4, 5.

**Acceptable Substitutes for Halon 1301 Total Flooding Agents Subject to Use Conditions  
under the Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

<b>Substitute</b>	<b>Trade Name</b>	<b>Conditions</b>	<b>Comments</b>
Powdered Aerosol E	Fire Pro	For use only in normally unoccupied areas.	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2010 standard for Aerosol Extinguishing Systems.</p> <p>For establishments manufacturing the agent or filling, installing, or servicing containers or systems to be used in total flooding applications, EPA recommends the following:</p> <ul style="list-style-type: none"> <li>- adequate ventilation should be in place to reduce airborne exposure to constituents of agent;</li> <li>- an eye wash fountain and quick drench facility should be close to the production area;</li> <li>- training for safe handling procedures should be provided to all employees that would be likely to handle containers of the agent or extinguishing units filled with the agent;</li> <li>- workers responsible for clean up should allow for maximum settling of all particulates before reentering area and wear appropriate protective equipment; and</li> <li>- all spills should be cleaned up immediately in accordance with good industrial hygiene practices.</li> </ul> <p>See additional comments 1, 2, 3, 4, 5.</p>
Phosphorous tribromide	PhostrEx	For use only in aircraft engine nacelles.	<p>For establishments manufacturing the agent or filling, installing, or servicing containers or systems, EPA recommends the following:</p> <ul style="list-style-type: none"> <li>- adequate ventilation should be in place and/or positive pressure, self-contained breathing apparatus (SCBA) should be worn;</li> <li>- training for safe handling procedures should be provided to all employees that would be likely to handle containers of the agent or extinguishing units filled with the agent; and</li> <li>- all spills should be cleaned up immediately in accordance with good industrial hygiene practices.</li> </ul> <p>See additional comments 1, 2, 3, 4, 5.</p>

**Acceptable Substitutes for Halon 1301 Total Flooding Agents Subject to Use Conditions  
under the Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

Substitute	Trade Name	Conditions	Comments
Powdered Aerosol F	KSA®	For use only in normally unoccupied areas.	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2010 standard for Aerosol Extinguishing Systems.</p> <p>For establishments filling, installing, servicing, using, or disposing of containers or systems to be used in total flooding applications, EPA recommends the following:</p> <ul style="list-style-type: none"> <li>- appropriate protective clothing (e.g., goggles, particulate removing respirators, and gloves) should be worn during the installation and maintenance of the extinguishing units filled with the agent or during clean up and disposal of this agent;</li> <li>- training should be provided to all employees that would be likely to handle containers of the agent or extinguishing units filled with the agent, required to clean up after discharge or required to work near spaces protected by Powdered Aerosol F.</li> </ul> <p>Releases in all settings should be limited to an appropriate design concentration for the protected space so that increased blood pH level would not adversely affect exposed individuals.</p> <p>Exposed individuals should be given an electrolyte solution to drink afterwards to restore the pH within the appropriate range.</p> <p>Each extinguisher should be clearly labeled with the potential hazards from use and safe handling procedures.</p> <p>In the case of an accidental spill, the area should be well-ventilated, and workers should wear protective equipment while following good industrial hygiene practices for clean-up and disposal.</p> <p>See additional comments 1, 2, 4, 5.</p>

**Acceptable Substitutes for Halon 1301 Total Flooding Agents Subject to Use Conditions  
under the Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

Substitute	Trade Name	Conditions	Comments
Powdered Aerosol G	Dry Sprinkler Powdered Aerosol (DSPA) Fixed Generators	For use only in normally unoccupied areas.	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2010 standard for Aerosol Extinguishing Systems.</p> <p>For establishments filling, installing, servicing, using or disposing of generator units or systems in total flooding applications, EPA recommends the appropriate protective clothing (e.g., goggles, particulate removing respirators, and gloves) should be worn during the installation and maintenance of the extinguishing units filled with the agent or during clean up and disposal of this agent.</p> <p>Powdered Aerosol G should be collected by hand (e.g., with a dustpan and duster or a vacuum cleaner); waste should be collected in suitable drums for disposal and the area should be washed clean with sufficient quantities of water; and training should be provided to all employees that would be likely to handle the agent or generator units filled containing the agent, required to clean up after discharge or required to work near spaces protected by Powdered Aerosol G fixed generator total flooding systems.</p> <p>In accordance with Department of Health and Human Services regulations (42 CFR Part 84), safety glasses and a NIOSH/CDC-approved N99 respirator are required for individuals installing Powdered Aerosol G fixed systems.</p> <p>Each generator unit should be clearly labeled with the potential hazards from use and safe handling procedures.</p> <p>In the case of an accidental discharge, the area should be well-ventilated, and workers should wear protective equipment while following good industrial hygiene practices for clean-up and disposal.</p> <p>See additional comments 1, 2, 4, 5, 6.</p>

Additional Comments

1. Must conform with OSHA 29 CFR 1910 Subpart L Section 1910.160.
2. Per OSHA requirements, protective gear (SCBA) must be available in the event personnel must reenter the area.
3. Discharge testing should be strictly limited only to that which is essential to meet safety or performance requirements.
4. The agent should be recovered from the fire protection system in conjunction with testing or servicing, and recycled for later use or destroyed.
5. EPA has no intention of duplicating or displacing OSHA coverage related to the use of personal protective equipment (e.g., respiratory protection), fire protection, hazard communication, worker training or any other occupational safety and health standard with respect to EPAs regulation of halon substitutes.
6. DSPA generators produce combustion byproducts (micron-sized dry particles and a gaseous mixture), that mix together into a uniform fire-extinguishing aerosol before being released into the protected area. The propellant components of the system generates inert gases, which function to physically extinguish the fire by the combined effects of straining the burning flame front and reducing the heat of the combustion sources. The small aerosol particles have a high surface area-to-volume ratio, which increases their ability to rapidly distribute throughout enclosed areas and to act as heat sinks, while not displacing oxygen.

**Acceptable Substitutes for Halon 1301 Total Flooding Agents Subject to Narrowed Use Limits  
under the Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

Substitute	Trade Name	Limitations	Comments
HFC-236fa		<p>Acceptable when manufactured using any process that does not convert perfluoroisobutylene (PFIB) directly to HFC-236fa in a single step:</p> <ul style="list-style-type: none"> <li>- for use in explosion suppression and explosion inertion applications, and</li> <li>- for use in fire suppression applications where other non-PFC agents or alternatives are not technically feasible due to performance or safety requirements:</li> </ul> <p>(a) because of their physical or chemical properties, or</p> <p>(b) where human exposure to the extinguishing agents may result in failure to meet safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Extinguishing Systems applicable use conditions</p>	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>The comparative design concentration based on cup burner values is approximately 6.4%.</p> <p>Users should observe the limitations on HFC-236fa acceptability by taking the following measures:</p> <ul style="list-style-type: none"> <li>(i) conduct an evaluation of foreseeable conditions of end use;</li> <li>(ii) determine that the physical or chemical properties or other technical constraints of the other available agents preclude their use; and</li> <li>(iii) determine that human exposure to the other alternative extinguishing agents may result in failure to meet safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</li> </ul> <p><b>Documentation of such measures should be available for review upon request.</b></p> <p>The principal environmental characteristic of concern for HFC-236fa is its high GWP of 9400 and long atmospheric lifetime of 226 years. Actual contributions to global warming depend upon the quantities emitted. Feasible for use in a normally occupied area.</p> <p>See additional comments 1, 2, 3, 4, 5</p>
C <sub>3</sub> F <sub>8</sub>	PFC-218, CEA-308	<p>Acceptable for nonresidential uses where other alternatives are not technically feasible due to performance or safety requirements:</p> <ul style="list-style-type: none"> <li>(a) because of their physical or chemical properties, or</li> <li>(b) where human exposure to the extinguishing agents may result in failure to meet applicable use conditions safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Extinguishing Systems</li> </ul>	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>The comparative design concentration based on cup burner values is approximately 8.8%.</p> <p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>Users should observe the limitations on PFC acceptability by taking the following measures:</p> <ul style="list-style-type: none"> <li>(i) conduct an evaluation of foreseeable conditions of end-use;</li> </ul>



**Acceptable Substitutes for Halon 1301 Total Flooding Agents Subject to Narrowed Use Limits  
under the Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

<b>Substitute</b>	<b>Trade Name</b>	<b>Limitations</b>	<b>Comments</b>
C <sub>3</sub> F <sub>8</sub> (con't)	PFC-218, CEA-308 (con't)	(see above)	<p>(ii) determine that the physical or chemical properties or other technical constraints of the other available agents preclude their use; and</p> <p>(iii) determine that human exposure to the other alternative extinguishing agents may result in failure to meet safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p><b>Documentation of such measures should be available for review upon request.</b></p> <p>The principal environmental characteristic of concern for PFCs is that they have high GWPs and long atmospheric lifetimes. Actual contributions to global warming depend upon the quantities of PFCs emitted.</p> <p>See additional comments 1, 2, 3, 4, 5.</p>
C <sub>4</sub> F <sub>10</sub>	PFC-410, CEA-410	<p>Acceptable for nonresidential uses where other alternatives are not technically feasible due to performance or safety requirements:</p> <p>(a) because of their physical or chemical properties, or</p> <p>(b) where human exposure to the extinguishing agents may result in failure to meet applicable use conditions safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Extinguishing Systems</p>	<p>Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p>Users should observe the limitations on PFC acceptability by taking the following measures:</p> <p>(i) conduct an evaluation of foreseeable conditions of end-use;</p> <p>(ii) determine that the physical or chemical properties or other technical constraints of the other available agents preclude their use; and</p> <p>(iii) determine that human exposure to the other alternative extinguishing agents may result in failure to meet safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.</p> <p><b>Documentation of such measures should be available for review upon request.</b></p> <p>The principal environmental characteristic of concern for PFCs is that they have high GWPs and long atmospheric lifetimes. Actual contributions to global warming depend upon the quantities of PFCs emitted.</p> <p>See additional comments 1, 2, 3, 4, 5.</p>
SF <sub>6</sub>		Only for use as a discharge agent in military applications and in civilian aircraft.	<p>Users should limit testing only to that which is essential to meet safety or performance requirements.</p> <p>This agent is used only to test new Halon 1301 systems.</p>

**Acceptable Substitutes for Halon 1301 Total Flooding Agents Subject to Narrowed Use Limits  
under the Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

<b>Substitute</b>	<b>Trade Name</b>	<b>Limitations</b>	<b>Comments</b>
CF <sub>3</sub> I		Use only in normally unoccupied areas.	Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems. See additional comments 1, 2, 3, 4, 5.
Gelled Halocarbon/Dry Chemical Suspension with any additive other than ammonium poly-phosphate or sodium bicarbonate	Envirogel with any additive other than ammonium polyphosphate or sodium bicarbonate	Use only in normally unoccupied areas	Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems, for whichever hydrofluorocarbon gas is employed.  Envirogel is listed as a streaming substitute under the generic name Gelled Halocarbon / Dry Chemical Suspension. Envirogel was also previously listed as a total flooding substitutes under the same generic name.  See additional comments 1, 2, 3, 4, 5.
HFC Blend B	Halotron II	Acceptable in areas that are not normally occupied only.	See additional comments 1, 2, 3, 4, 5.
HFC227-BC		Sodium bicarbonate release in all settings should be targeted so that increased pH level would not adversely affect exposed individuals. Users should provide special training to individuals required to be in environments protected by HFC227BBC extinguishing systems.  Each HFC227BBC extinguisher should be clearly labeled with the potential hazards from use and safe handling procedures.	Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.  See additional comments 1, 2, 3, 4, 5.

**Additional Comments**

1. Should conform with OSHA 29 CFR 1910 Subpart L Section 1910.160.
2. Per OSHA requirements, protective gear (SCBA) must be available in the event personnel must reenter the area.
3. Discharge testing should be strictly limited only to that which is essential to meet safety or performance requirements.
4. The agent should be recovered from the fire protection system in conjunction with testing or servicing, and recycled for later use or destroyed.
5. EPA has no intention of duplicating or displacing OSHA coverage related to the use of personal protective equipment (e.g., respiratory protection), fire protection, hazard communication, worker training or any other occupational safety and health standard with respect to halon substitutes.

**Unacceptable Substitutes for Halon Fire Suppression and Explosion Protection Systems  
under the Significant New Alternatives Policy (SNAP) Program as of May 29, 2013**

<b>Substitute</b>	<b>Trade Name</b>	<b>ODS Being Replaced</b>	<b>Reason</b>
CFC-11		Halon 1211 streaming agents	This agent has been suggested for use on large outdoor fires for which non-ozone depleting alternatives are currently available. In addition, CAAA section 610 bans the use of CFCs in portable extinguishers.
HFC-32		Halon 1301 total flooding agents	This agent is flammable.
Chlorobromo-methane (Halon 1011)		Halon 1301 total flooding agents	Other alternatives exist with zero or lower ODP; OSHA regulations prohibit its use as an extinguishing agent in fixed extinguished systems where employees may be exposed. See 29 CFR 1910.160(b)(11).
HBFC-22B1	FM-100	Halon 1301 total flooding agents	HBFC-22B1 is a Class I ozone depleting substance with an ozone depletion potential of 0.74. The manufacturer of this agent terminated production of this agent January 1, 1996, except for critical uses, and removed it from the market because it is a fetal toxin.